

No. 656,331.

Patented Aug. 21, 1900.

H. STILLMAN.

APPARATUS FOR PURIFYING WATER.

(Application filed Mar. 28, 1900.)

(No Model.)

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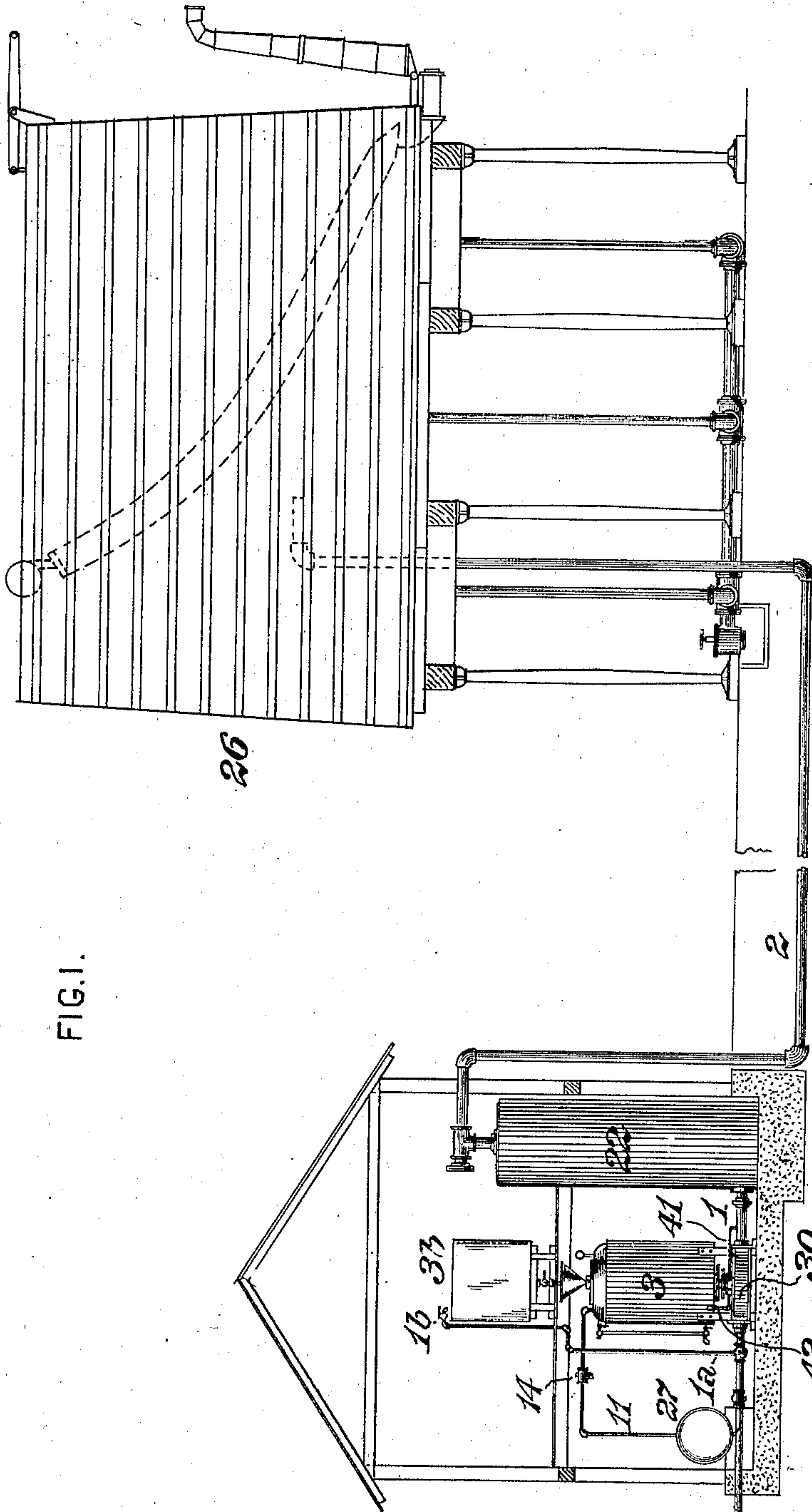


FIG. 1.

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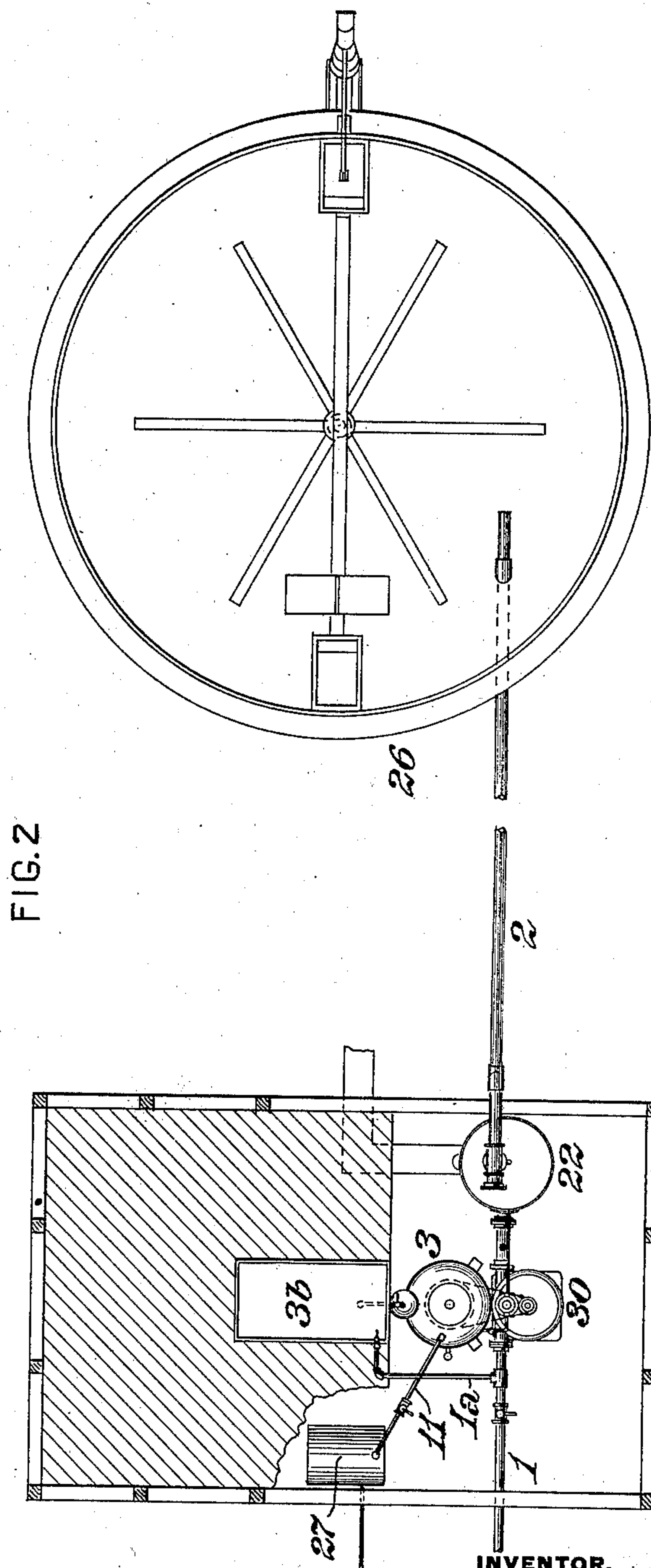
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4 Sheets—Sheet 2.



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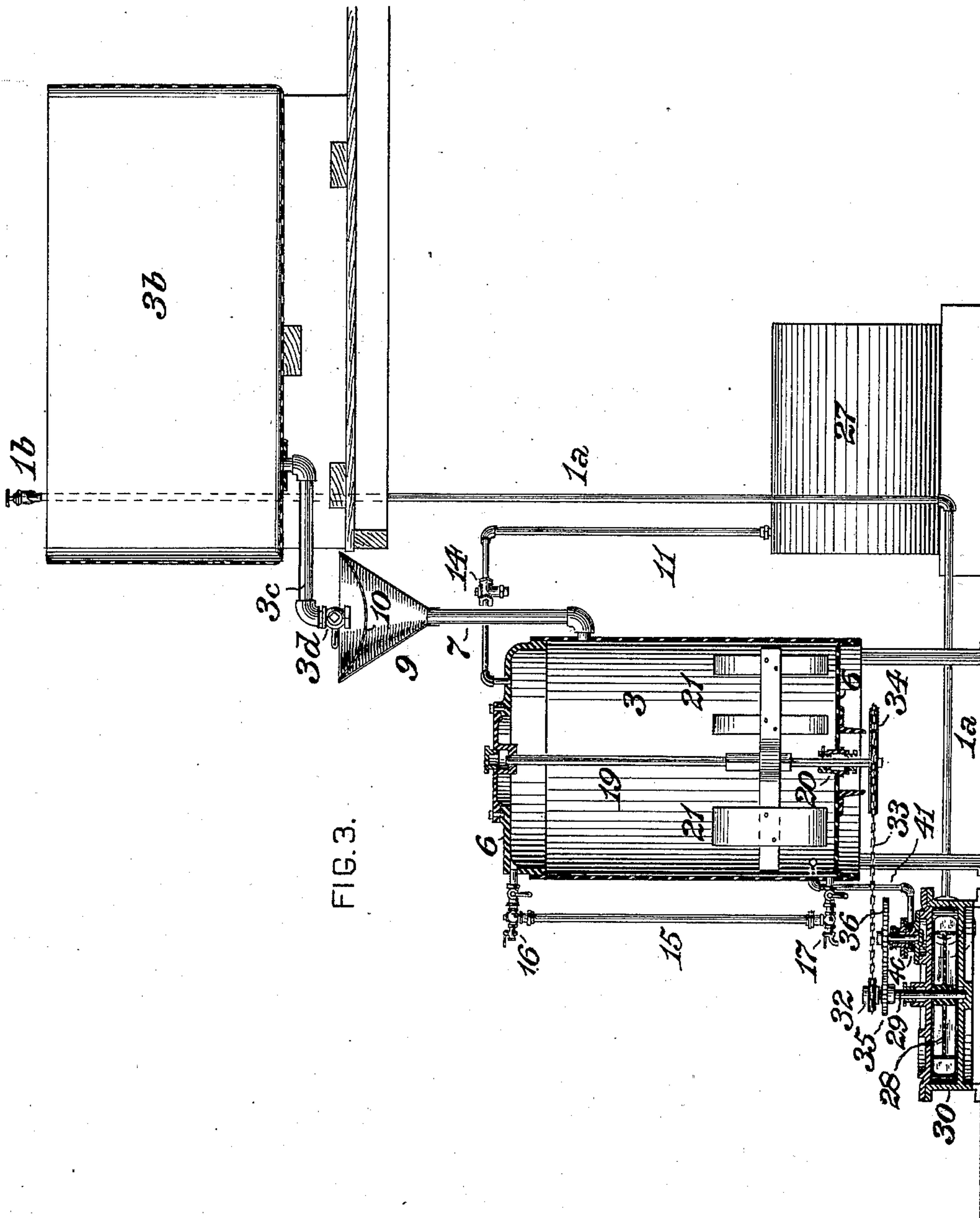


FIG. 3.

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FIG. 4.

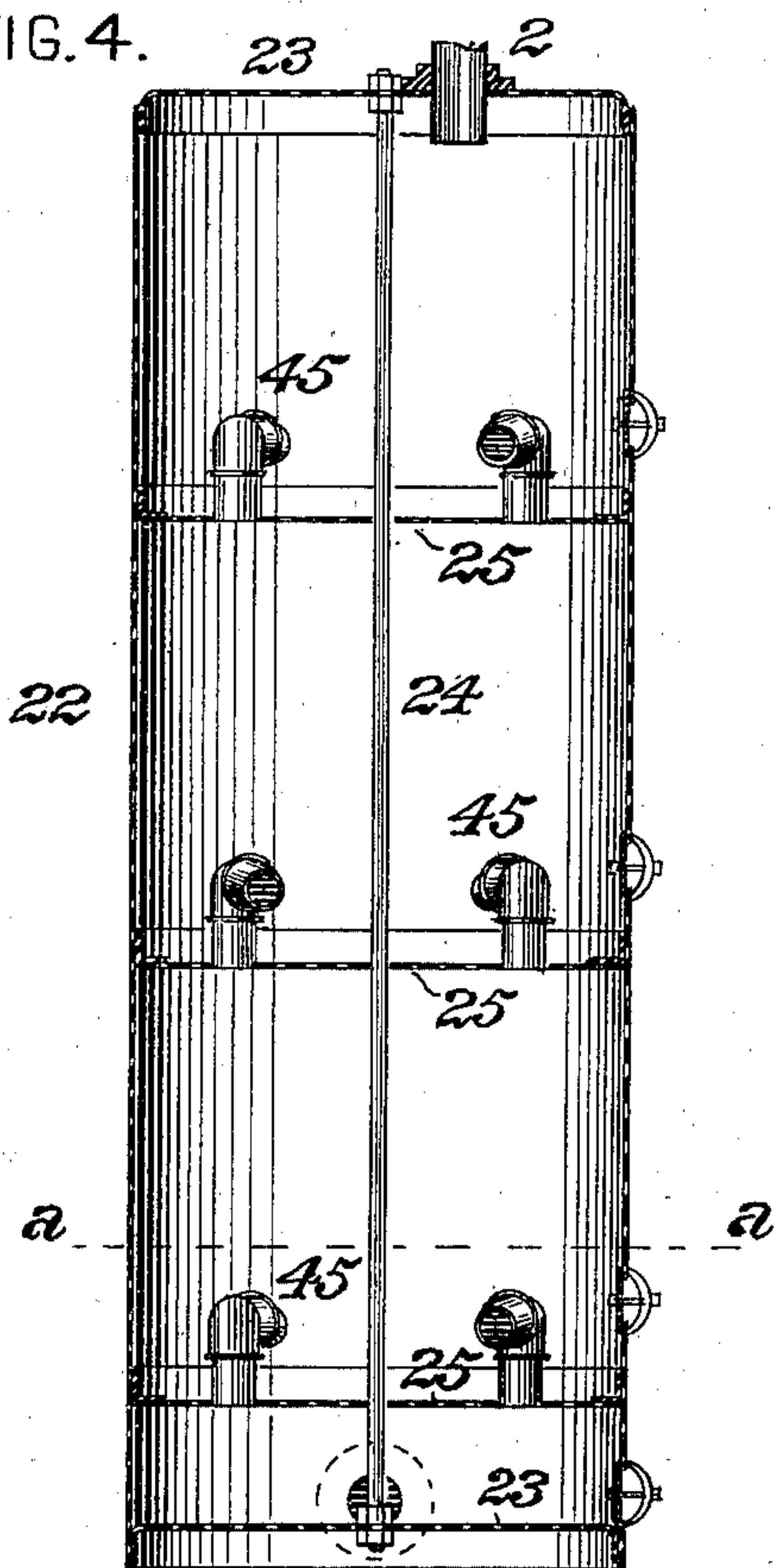


FIG. 6.

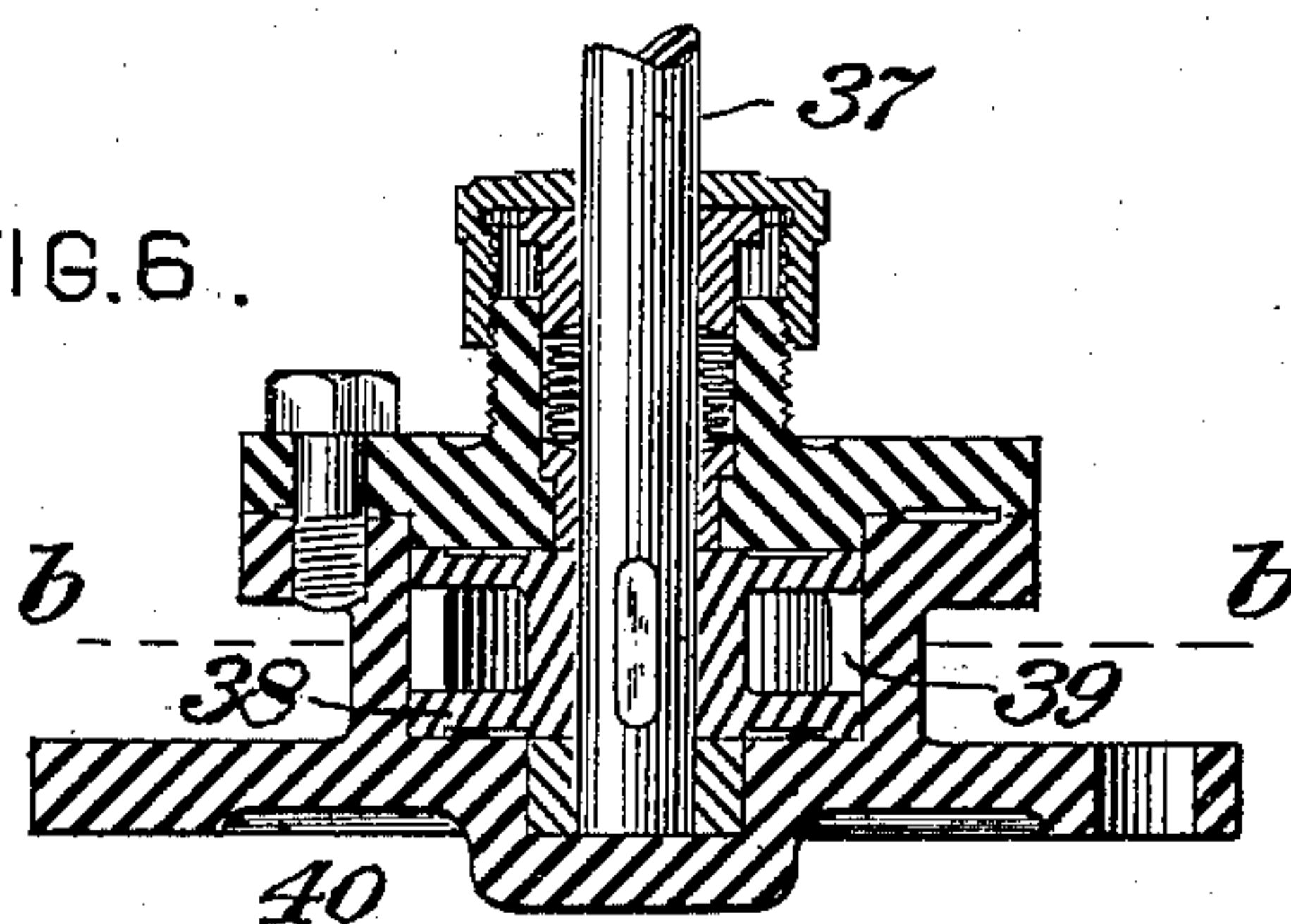


FIG. 7.

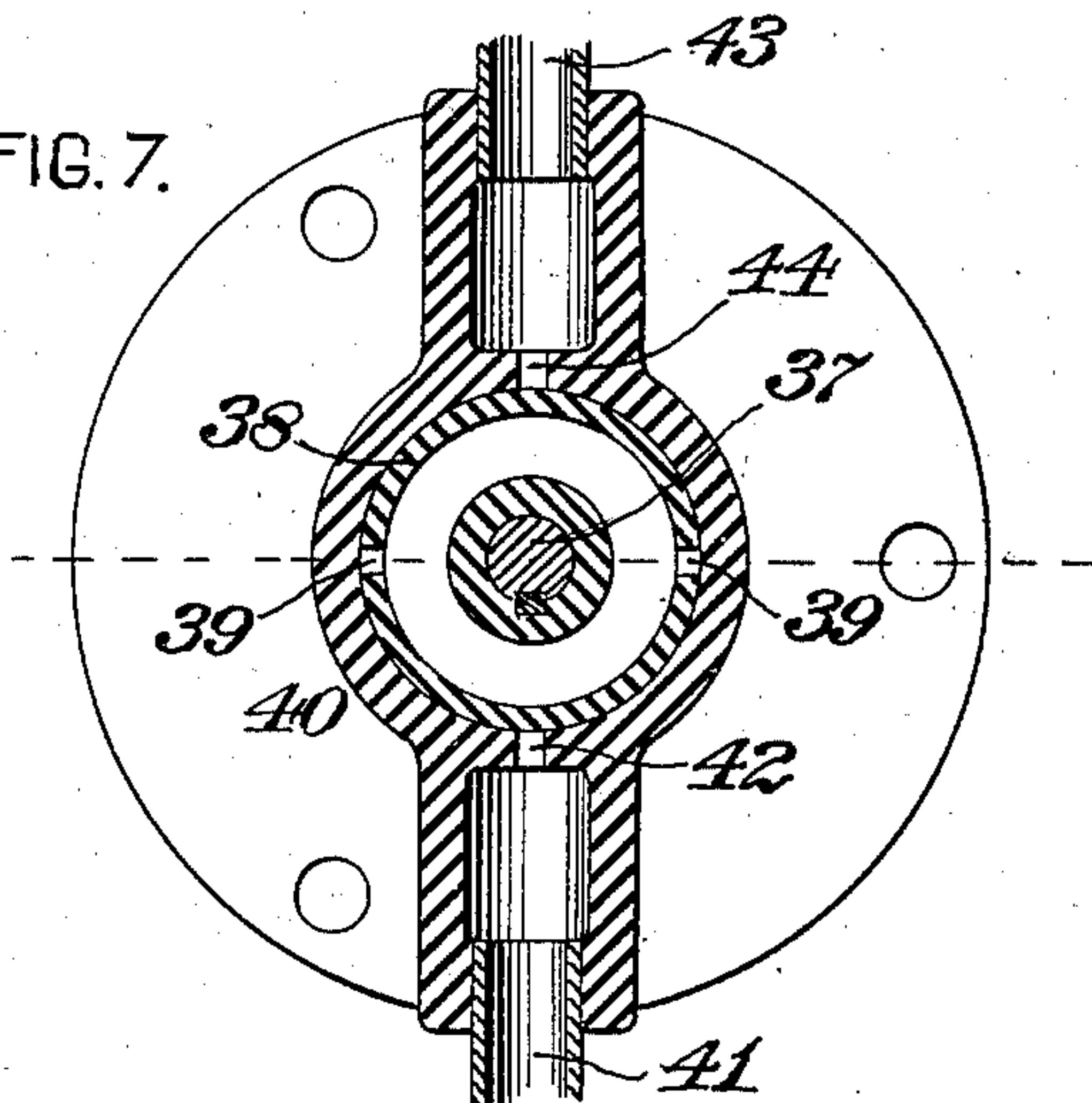


FIG. 8.

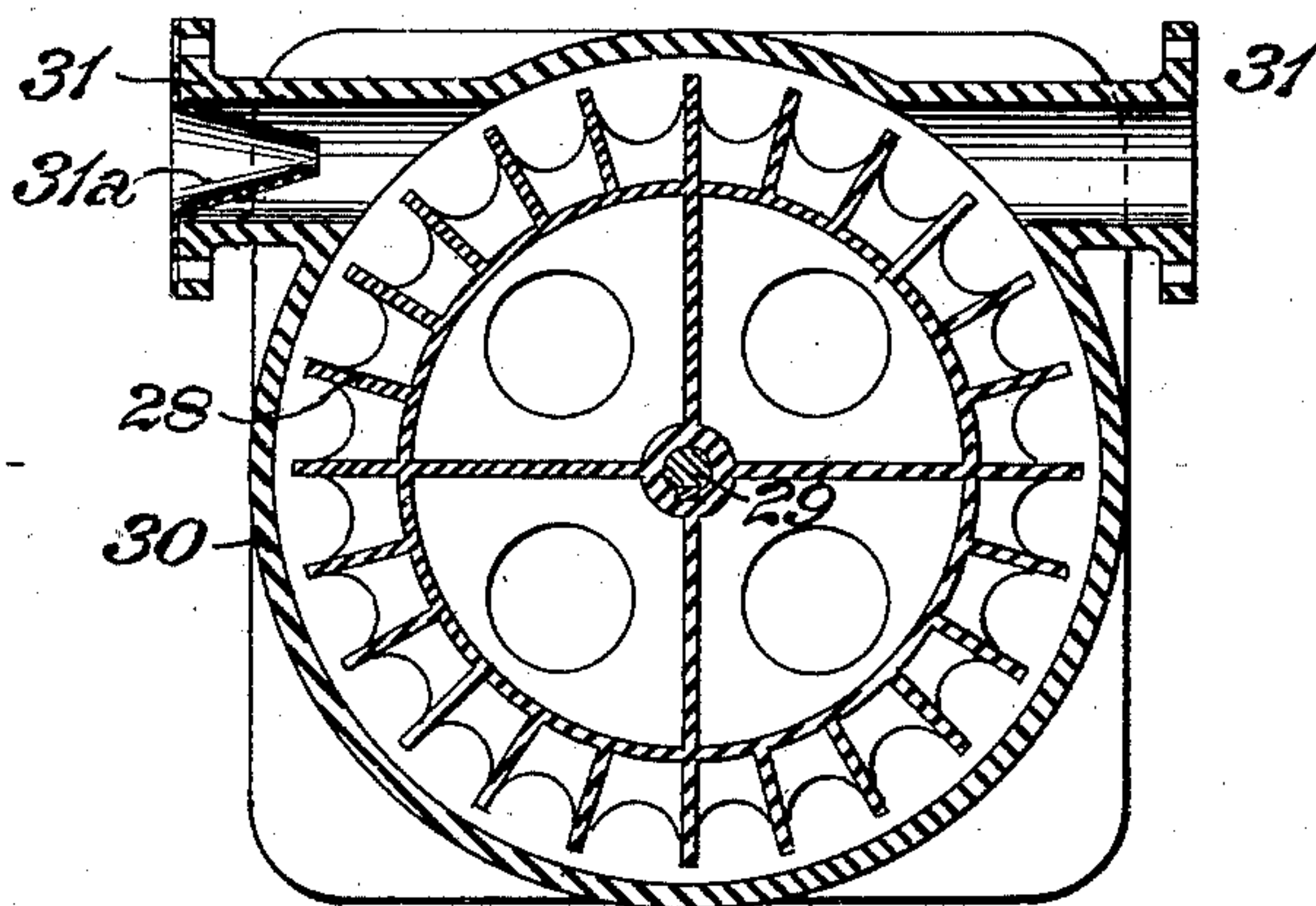
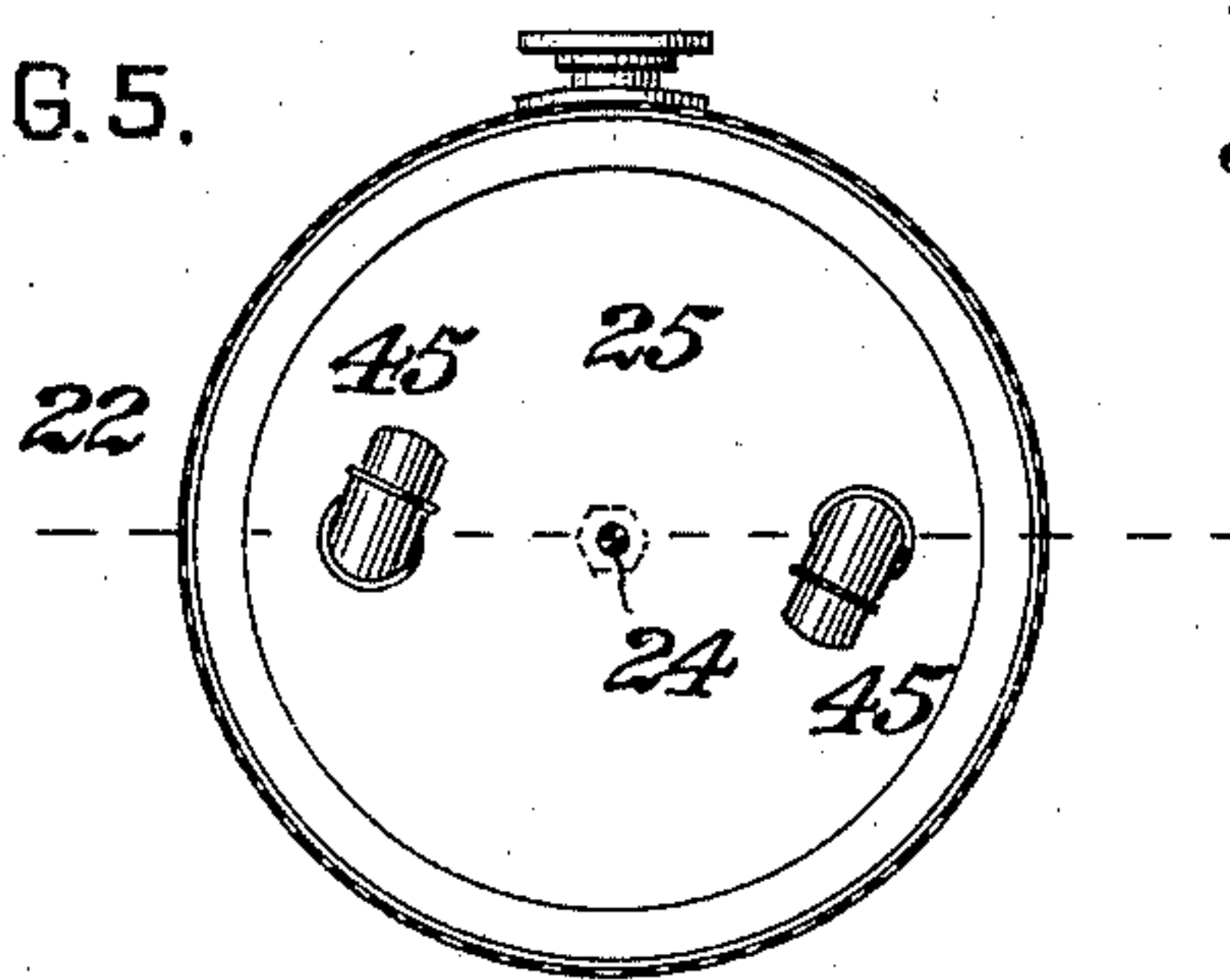


FIG. 5.



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# UNITED STATES PATENT OFFICE.

HOWARD STILLMAN, OF SACRAMENTO, CALIFORNIA.

## APPARATUS FOR PURIFYING WATER.

SPECIFICATION forming part of Letters Patent No. 656,331, dated August 21, 1900.

Application filed March 28, 1900. Serial No. 10,476. (No model.)

*To all whom it may concern:*

Be it known that I, HOWARD STILLMAN, of Sacramento, in the county of Sacramento and State of California, have invented a certain  
5 new and useful Improvement in Automatic Water-Treating Apparatus, of which improvement the following is a specification.

My present invention relates to apparatus for treating water with chemicals for the purpose of clearing it of incrustating matter and for separating or settling the treated water and is an improvement upon that for which Letters Patent of the United States, No. 595,793, were granted and issued to me under  
15 date of December 21, 1897.

The objects of my invention are to effect a simplification and economization of the apparatus, to render its operation automatic, and to attain a thorough mixture of the contents  
20 of the circulating-tank and the prevention of the deposit of precipitated matter therein.

The improvement is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is  
25 a view in elevation of a water-treating apparatus, illustrating an application of my invention; Fig. 2, a plan or top view of the same; Fig. 3, a vertical central section, an enlarged scale, through the mixing-vat, chemical-tank, and motor; Fig. 4, a similar section  
30 through the circulating-tank; Fig. 5, a horizontal section through the same at the line *a a* of Fig. 4; Fig. 6, a vertical central section through the feed-regulator; Fig. 7, a horizontal section through the same at the line *b b*  
35 of Fig. 6, and Fig. 8 a horizontal section through the motor.

In the practice of my invention I provide, as in my Letters Patent No. 595,793 aforesaid,  
40 a supply-main 1, through which the water to be treated is forced under hydraulic pressure obtained either from a pumping-station or a gravity-supply to a circulating-tank 22, and thence through an outlet-section 2 of the water-main to a suitable settling or precipitating  
45 tank 26, which may be of any known and preferred construction. A mixing-tank 3<sup>b</sup>, to which water may be supplied as desired by a pipe 1<sup>a</sup>, leading from the supply-main and  
50 governed by a cock 1<sup>b</sup>, is located in position to be conveniently supplied with a mixture of suitable chemicals and to deliver a solu-

tion thereof to a chemical-tank 3, substantially similar to the line-tank set forth in Letters Patent No. 595,793 aforesaid. The chemical-tank is closed by tight heads 6 and provided with a filling-pipe 7, which may be controlled by a cock, and having at its upper or receiving end a funnel 9, protected by a strainer 10. A supply-pipe 3<sup>c</sup>, controlled by a  
55 cock 36, leads from the mixing-tank 3<sup>b</sup> to a point above the funnel 9. A glass gage-tube 15, having an upper bleeder-cock 16 and a lower drain-cock 17, is connected to the outside of the chemical-tank, and it may also be  
60 provided with a suitable pressure-gage. An air-supply pipe 11, in which is fitted a pressure-regulator 14, leads from an air-reservoir 27 or other source of compressed air to the chemical-tank for the purpose of effecting  
65 the discharge of the solution therefrom to the water-supply main.

The chemical-tank 3 is, as in Letters Patent No. 595,793, provided with means for agitating and mixing its contents, the same  
75 being preferably in the form of a stirrer consisting of a vertical shaft 19, which passes through a stuffing-box 20 in the head of the tank and carries a series of stirring-blades. Under my present invention the head of  
80 water in the supply-main is utilized to rotate the stirrer, as well as to actuate an automatic feed-regulator by which limited quantities of the solution of chemicals are delivered at brief intervals from the chemical-tank to the  
85 water in the main. To this end a motor 28 in the form of a water-wheel of the ordinary "hurdy-gurdy" type is fixed upon a shaft 29, which is mounted in bearings in a casing 30, having lateral nozzles or passages 31,  
90 which are interposed between and connected to two adjacent sections of the water-supply main 1. A nozzle 31<sup>a</sup> is fitted in the supply-passage 31 of the motor-casing to direct the inflowing water upon the blades of the motor  
95 which is rotated by the impact of the water, and the water after passing the blades is discharged through the opposite passage and passes on to the circulating and settling tanks. The motor-shaft 29 passes through  
100 a stuffing-box in the casing 30 and carries on its upper end a sprocket-wheel 32, which through a chain belt 33, rotates a larger sprocket-wheel 34, fixed on the stirrer-shaft



19. A regulated supply of chemical solution is delivered to the current of water flowing through the supply-main by a suitable automatic feed-regulator which in the instance  
 5 exemplified is in the form of a hollow cylindrical valve 38, fixed upon a spindle 37 and provided with narrow peripheral ports or openings 39. The regulator is fitted to turn freely in the casing 40, in which its spindle  
 10 37 is journaled and which is provided with a proper stuffing-box for said spindle and is preferably fixed to the top of the motor-casing 30. A pipe 41 leads from the chemical-tank 3 to a nozzle or passage on one side of  
 15 the casing 40, which nozzle communicates by a narrow port or slot 42 with the space or chamber in which the regulator 38 rotates, and a pipe 43 is connected to a nozzle on the opposite side of the casing, which communi-  
 20 cates with the regulator-chamber by a narrow port or slot 44. The opposite end of the pipe 43 is connected with the supply-main 1. A spur-pinion 35, fixed upon the motor-shaft 29, engages a corresponding gear 36 on the  
 25 regulator-spindle 37 and imparts rotation thereto and to the connected feed-regulator. The ports 39 of the regulator register in its revolutions with the ports 42 44 of the casing-nozzles, and at each revolution a limited  
 30 quantity of chemical solution is discharged from the chemical-tank 3 into the water-supply main, the discharging impulses being due to the overbalancing air-pressure in the chemical-tank derived from the air-reservoir  
 35 27 through the air-supply pipe 11.

The specific form of automatic feed-regulator above described is not an essential of my invention, as a corresponding automatic regulation of the supply of chemical solution  
 40 may be effected by other mechanism actuated by the head of water in the supply-main. Thus, for example, a small feed-pump of the ordinary plunger construction may be substituted, said pump being actuated by an ec-  
 45 centric fixed upon the motor-shaft 29 and having a suction-pipe connected to the chemical-tank 3 and a delivery-pipe leading into the supply-main 1. In such case the air-supply to the chemical-tank, which might not in  
 50 some locations be readily obtainable, would be dispensed with, as the chemical solution would be injected in regulated quantities by the forcing action of the pump, which for the purposes of my invention would constitute  
 55 a mechanical equivalent for the rotary valvular regulator which is herein described and shown.

After being properly supplied with solution from the chemical-tank 3 the water in  
 60 the supply-main 1 is delivered into and passed through a circulating-tank 22, which is preferably of cylindrical form, closed at its ends by tight heads 23 and strengthened by longitudinal brace or braces 24. The construction herein set forth presents the ad-  
 65 vantages of being of simpler and less expensive construction than that of Patent No.

595,793 aforesaid and of being more readily cleansed and free from objection as to deposit of solid matter. The circulating-tank  
 70 is divided by transverse partitions 25, which extend entirely across it, into a plurality of separate chambers or compartments, communication between which is afforded by  
 75 short vertical pipes fixed in the partitions and provided with horizontal or downwardly-inclined elbows or nozzles 45. As shown in Figs. 4 and 5, the nozzles of each partition are turned in opposite directions, so as to im-  
 80 part a rotary movement to the water as discharged into the several compartments, and they are relatively reversed on alternate partitions, so that the direction of movement of the water is reversed in alternate compart-  
 85 ments. This reversal of the movement of the water substantially promotes the thorough mixture of the chemical solution therewith and also prevents the deposit of precipitated matter, allowing the same to pass on and assist in settling the treated water.  
 90 After passing through the circulating-tank 22 the treated water is discharged through a delivery-main into a settling or storage tank 26, which may be of any suitable and preferred construction and from which it is  
 95 withdrawn for use from time to time as desired.

The apparatus herein set forth has been applied in practical service in a number of instances and has been found to satisfactorily  
 100 comply with the conditions and attain the results under and for which it was devised.

I claim as my invention and desire to secure by Letters Patent—

1. In an apparatus for the treatment of  
 105 water, the combination of a motor-casing interposed in the water-main, a motor therein, a chemical-tank, a connection between said tank and the motor-casing, and a valve in said connection operatively connected to the  
 110 motor.

2. In an apparatus for the treatment of water, the combination of a motor-casing interposed in the water-main, a motor therein, a chemical-tank, a connection between said  
 115 tank and the motor-casing, a rotary valve alternately opening and closing said connection, and operative means between the motor and said valve.

3. In an apparatus for the treatment of  
 120 water, the combination of a water-main, a chemical-tank, a connection between said main and tank, a compressed-air reservoir communicating with said tank to subject the contents thereof to pressure, and means con-  
 125 trolled by the water-current in said main for alternately opening and closing said connection.

4. In an apparatus for the treatment of water, the combination of a water-supply  
 130 main, a chemical-tank, a stirrer fitted to rotate in said tank, an automatic feed-regulator controlling communication between the chemical-tank and water-supply main, a mo-



tor impelled by the current of water in the supply-main, and operative connections between the motor-shaft and the stirrer and feed-regulator respectively.

5 5. In an apparatus for the treatment of water, the combination of a water-supply main, a chemical-tank, a stirrer fitted to rotate in said tank, an automatic feed-regulator controlling communication between the  
10 chemical-tank and water-supply main, a motor-case having lateral passages each communicating with a section of the supply-main, an impact water-motor fixed on a shaft journaled in said casing, and operative connections between the motor-shaft and the stirrer  
15 and feed-regulator respectively.

6. In an apparatus for the treatment of

water, the combination of a water-supply main, a chemical-tank, means for effecting a regulated supply of solution from the chemical-tank to the water-supply main, a circulating-tank connected at one end with the supply-main, partitions dividing the circulating-tank into separate compartments, pipes establishing communication between said  
25 compartments and provided with oppositely-extending nozzles, and a discharge-main leading from the end of the circulating-tank opposite that to which the supply-main is connected.

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Witnesses:

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